

ABSTRACT

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A secondary cell employs a non-aqueous electrolyte solution including a non-aqueous solvent and a salt, and a flame retardant material that is a liquid at room temperature and pressure and substantially immiscible in the non-aqueous electrolyte solution. The non-aqueous electrolyte solution is formed by dissolving a salt, preferably an alkali metal salt, in a non-aqueous solvent. The non-aqueous solvent preferably includes a cyclic carbonate and/or a linear carbonate. The cyclic carbonate preferably contains an alkylene group with 2 to 5 carbon atoms, and the linear carbonate preferably contains a hydrocarbon group with 1 to 5 carbon atoms.

Preferred salts include LiPF_6 and LiBF_4 at a concentration between about 0.1 to 3.0 moles/liter in the non-aqueous solvent. The flame retardant material is preferably a halogen-containing compound, and preferred halogen containing compounds are perfluoralkyl groups and perfluorether groups present in an amount per weight of non-aqueous solvent in a range of from about 1 to about 99 wt %.